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ABSTRACT

A study analyzed vocational education research applications submitted to the U.S. Office of Education for potential funding in fiscal year 1975 to determine if there is a point of diminishing returns in quality as the number of pages in a research proposal or application are increased. A total of 353 applications were used to explore the relationship between proposal length and quality. Proposal length was determined by three measures: (1) the sum of pages devoted to objectives and need, results and benefits, and the approach; (2) the total program narrative, including (1) above; and (3) the total page count in the application. Proposal quality was determined by mean evaluator rating of the applications. Proposals were evaluated on such criteria as addressed priority area, need and problems, objectives, plan, results, personnel, institutional commitment, and budget. The results of regression analyses indicate that the number of pages in a research application is, up to a point, positively related to the evaluator rating of the application. After that point, the addition of further pages does not add to quality and, in fact, diminishes the proposal's rating. Based on the findings, the study concludes that a proposal's rating ceases to increase when the total length exceeds 132 pages. (LRA)

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QUANTITY VS. QUALITY IN RESEARCH PROPOSALS: AN EMPIRICAL JUSTIFICATION FOR LIMITING THE LENGTH OF USOE GRANT APPLICATIONS

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Introduction

This report summarizes the results of a re-analysis of vocational education research applications submitted to the U.S. Office of Education for potential funding in FY 1975. The analysis was undertaken to provide support to the contention that there is a point of diminishing returns in quality as the number of pages in a research proposal or application are increased. Theoretically, it was postulated that reviewers would reach a saturation point in terms of information that they could effectively process. After reaching this point, increasing the length of a proposal would no longer contribute to quality, as measured by reviewer ratings. In fact, it was hypothesized that after passing the saturation point, the addition of further pages would prove detrimental to an application's quality rating. Support for this contention would provide a rationale for setting a page limitation on research proposals submitted to USOE or other government agencies. The implications of such a limitation are reduced time and expense for proposal review and a reduction in the cost of proposal preparation, which indirectly may also be a government expense.

In order to test the relationship between proposal length and reviewer evaluations, data collected from FY 1975 vocational education research applications to USOE were analyzed. A summary of the analyses performed is presented in the next section of the report, followed by a discussion of the results and their implications.

Analysis Summary

The data utilized to explore the relationship between proposal length and quality were collected by Dr. Jack A. Wilson as part of his doctoral dissertation research (Wilson, 1977). A total of 353 vocational education research applications comprised the data set. One observation was deleted from the data because

the total pages of the application (1202) were considered extreme. Numerous measures of proposal length were included in the data set; however, only three were selected for the purposes of this analysis:

(1) The sum of pages devoted to objectives and need for assistance, results or benefits expected, and the approach.

(2) The total program narrative--in addition to (1) above, this includes miscellaneous information included in a program narrative.

(3) The total page count of the application--includes all pages with any printing on them.

For a more detailed description of the sections of an application, see "Instructions for Applications for Federal Assistance," OE Form 3176, 7/75.

The dependent variable in this analysis was proposal quality, as measured by mean evaluator ratings of the applications. This was computed by summing the ratings on each evaluation criterion, i.e., addressed priority area, need and problem, objectives, plan, results, personnel, institutional commitment, and budget. This yielded a single total score for each evaluator on each application. A mean was then computed across evaluators for each application to provide what was considered a stable measure of the application's quality.

To measure the relationship between length and quality, three separate regression analyses, one for each of the three independent variables, were performed. Since it was expected that the effect of the length of the proposal on evaluator ratings would tend to decrease as the number of pages increased, a curvilinear model was hypothesized. The general model used to fit the data was of the form,

$$Y = aX^2 + bX + c,$$

where Y is the mean evaluator rating of the application,

X is the number of pages of the application, and

a, b, and c are regression weights.

The GLM procedure of the Statistical Analysis System (SAS) was used to test the hypotheses and fit the data (Barr, et. al., 1976).

The first derivative (dy/dx) of each of the derived regression equations was calculated and set to zero to determine the maximums of the curves. The maximum represents the point in the curve where the slope changes from positive to negative, i.e., where the addition of pages to a proposal would result in a lower rather than higher evaluator rating. A discussion of the results of these analyses follows.

Results

The results of each of the regression analyses indicate that the number of pages in a research application is, up to a point, positively related to the evaluator rating of the application. After that point, the addition of further pages does not add to quality and, in fact, diminishes the proposal's rating. For each of the page variables, both the linear and curvilinear components of the regression equations were highly significant (See Table 1). Furthermore, the models used to fit the data accounted for 20-23% of the variance in evaluator ratings. The strength of this relationship between pages and quality provides support for the use of the models in establishing page limitations. Plots of each of the regression curves are presented in Figures 1-3. Scales on the horizontal axis were made to accommodate all actual values of the independent variables of concern. (Appendix A presents scatter plots of the raw data.)

As predicted, the relationship between pages (whether the sum of those devoted to needs, result and approach; the total program narrative; or the total page count) and mean evaluator ratings is curvilinear. In each case there is a point where the addition of pages ceases to produce an increase in mean total evaluator rating. These points, which represent a potential upper limit on proposal length, were identified from the first derivatives of the regression curves

Table 1

Regressions of Evaluator Ratings as
a Function of Proposal Length

Parameter	Beta Weight (B_i)	t for Ho: $B_i = 0$*
1. Sum of Need, Results and Approach Pages (X), $R^2 = .23$		
Intercept	28.532	12.90
X	1.150	8.76
X^2	-0.009	-6.30
2. Total Program Narrative (X), $R^2 = .20$		
Intercept	30.795	14.39
X	0.922	8.08
X^2	-0.006	-5.56
3. Total Page Count (X), $R^2 = .20$		
Intercept	29.663	13.36
X	0.525	8.90
X^2	-0.002	-6.91

* All tests significant, $p < .0001$

Figure 1

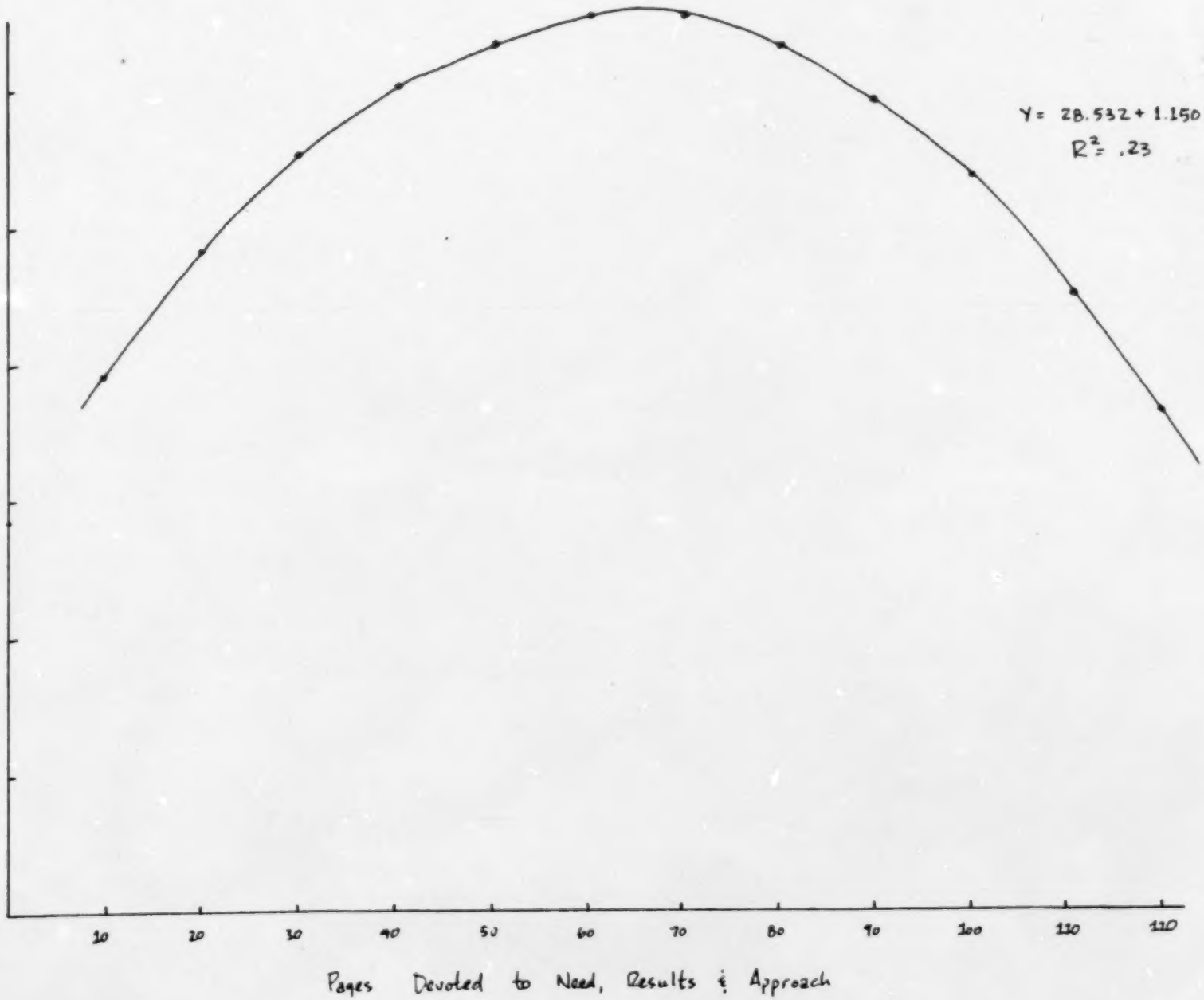

Y = 28.532 + 1.150X - .009X²
R² = .23
Mean Evaluation Rating
60
50
40
30
20
10
10
20
30
40
50
60
70
80
90
100
110
120
Pages Devoted to Need, Results & Approach

Figure 2

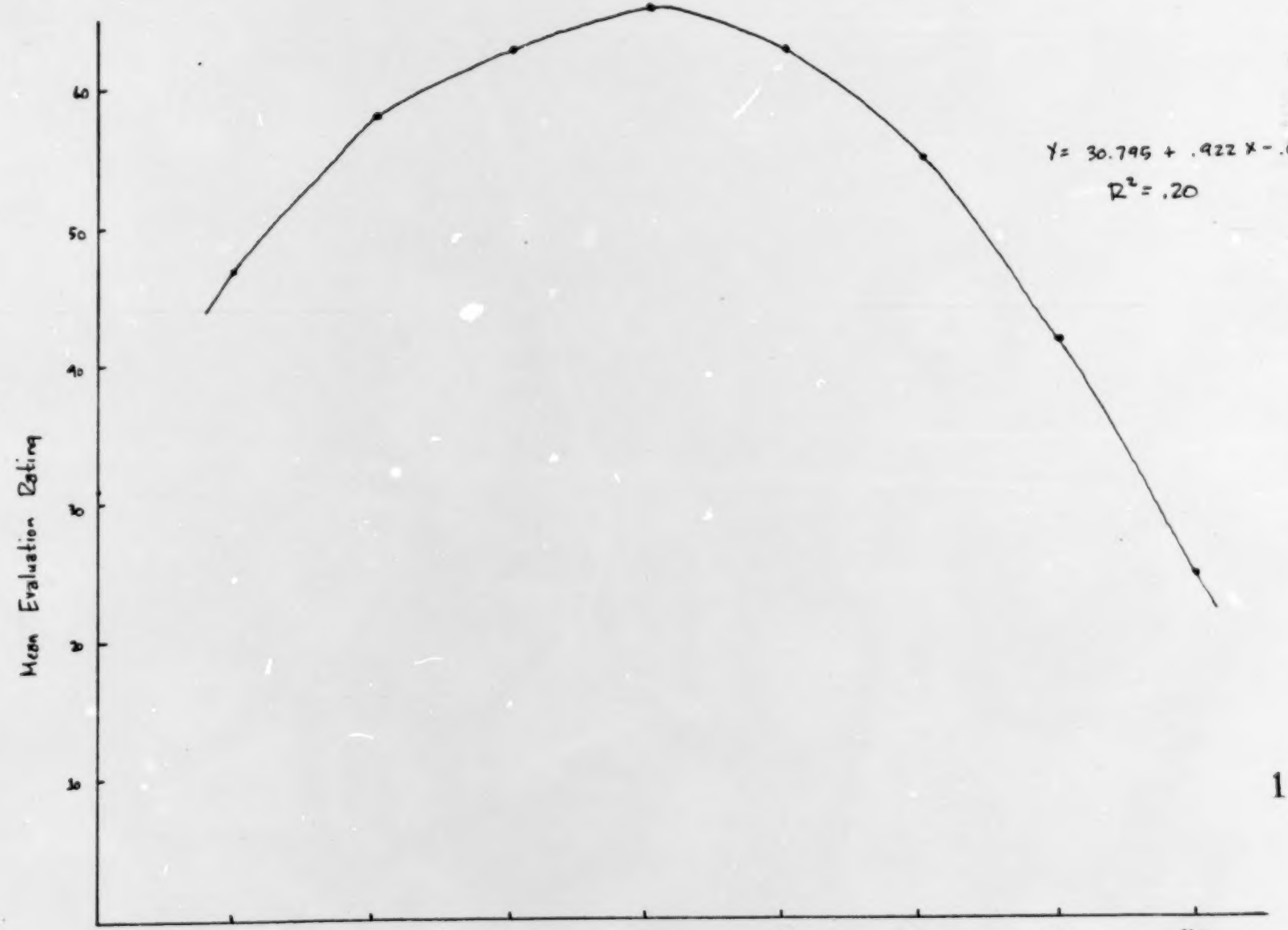
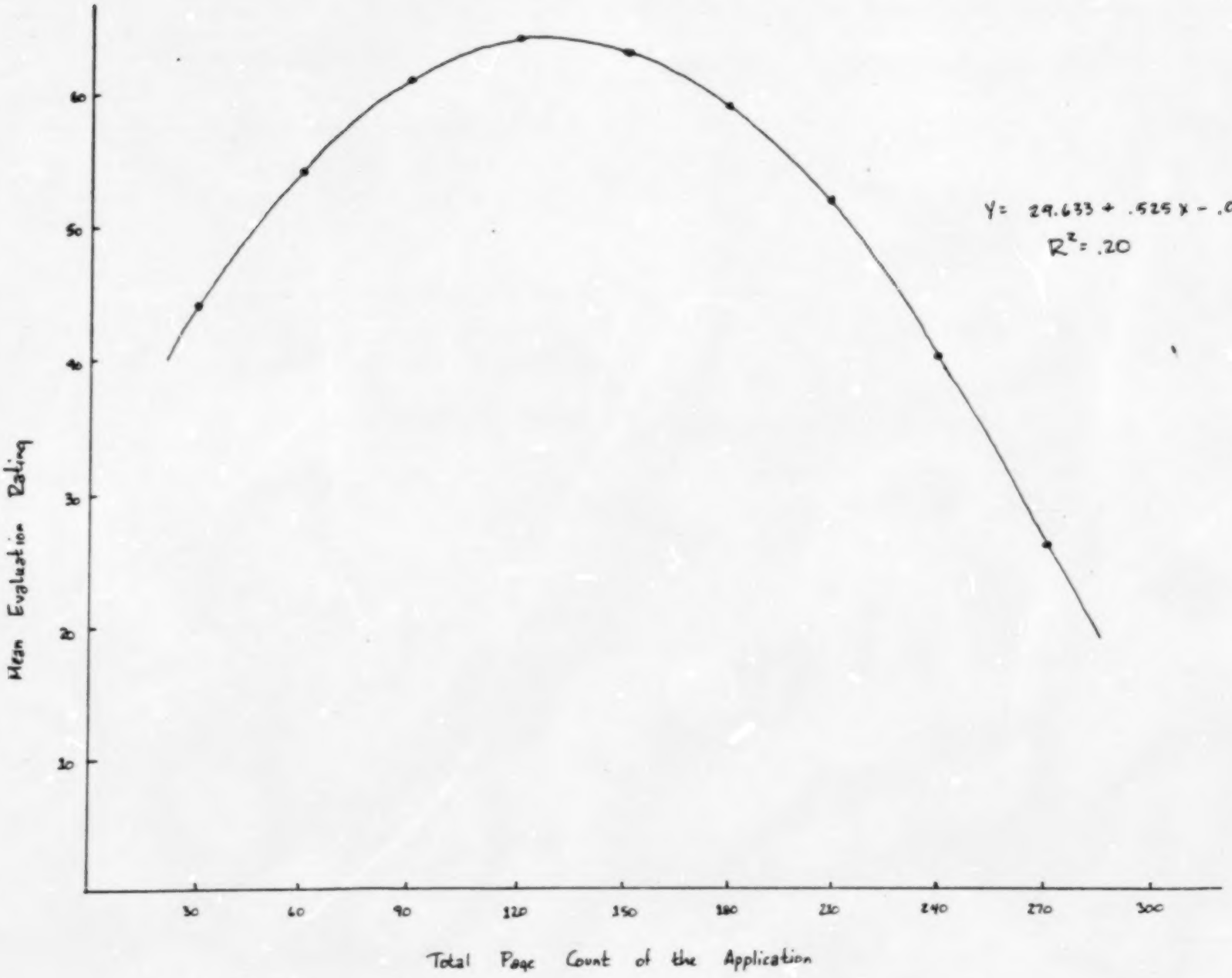

Mean Evaluation Rating
60
50
40
30
20
20
40
60
80
100
120
140
160
Pages in the Program Narrative
Y= 30.795 + .922 X - .006 X²
R² = .20

Figure 3



11

12

(See Appendix B). For the first analysis (number of pages devoted to needs, results and approach), the maximum point on the curve is 63.9 pages. For total program narrative the maximum is 76.8. The analysis of total page count produced a maximum point of 131.3 pages.

Conclusions

The data which produced these results were from FY 1975 vocational education Part C grant applications. To the extent that current application process characteristics resemble the Part C proposal process, the results of these analyses can provide a basis for setting page limitations on sections of grant applications. It was shown through this analysis that any more than 64 pages devoted to needs, results and approach does not contribute to proposal quality. Furthermore, the analyses indicate that seventy-seven pages would be an appropriate cut-off point for a complete program narrative section. Finally, these analyses show that a proposal's rating ceases to increase when the total length exceeds 132 pages.

Based on these analyses it appears that the USOE could justifiably set limitations on the number of pages which applicants can include in grant proposals. Such limitations would serve to reduce governmental costs in terms of both the amount of time required to review applications and the possible indirect costs to the government associated with proposal preparation. These limitations are as follows:

(1) Total pages included in Needs, Results and Approach: sixty-four (64) pages double-spaced typed;

(2) Total pages in program narrative (includes above plus miscellaneous background information): seventy-seven (77) pages double-spaced typed;

(3) Total page count of the application, including all forms and appendices: one hundred thirty-two (132) pages double-spaced typed.

References

Barr, Anthony J., Goodnight, J.H., Sall, J.P., and Helwig, J.T. A User's Guide to SAS 76. Raleigh, NC: Sparks Press, 1976.

U.S. Office of Education. Instructions for Applications for Federal Assistance, OE Form 3176. Washington, DC: Author, July 1975.

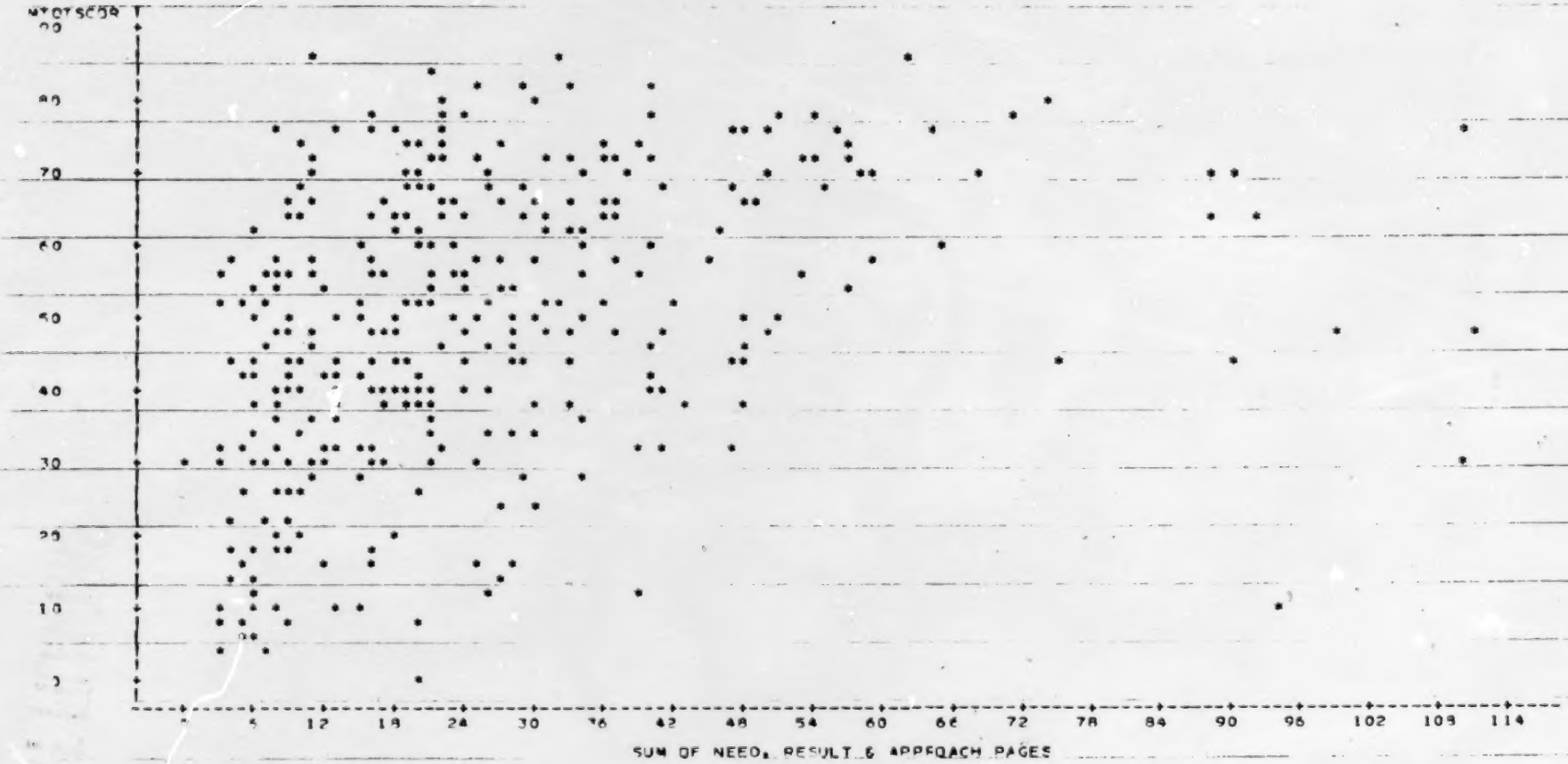
Wilson, Jack A. Investigation of Characteristics of Vocational Education Research Grant Applications and Their Relationship to Evaluator Ratings of Quality. Unpublished Doctoral Dissertation submitted to California Western University, June 1977.

APPENDIX A

Scatter Diagrams of Number
of Pages in Proposal and Mean
Evaluator Quality Rating

REGRESSION OF SUM OF NEED, RESULT & APPROACH PAGES 14:28 FRIDAY, MAY 18, 1979 60

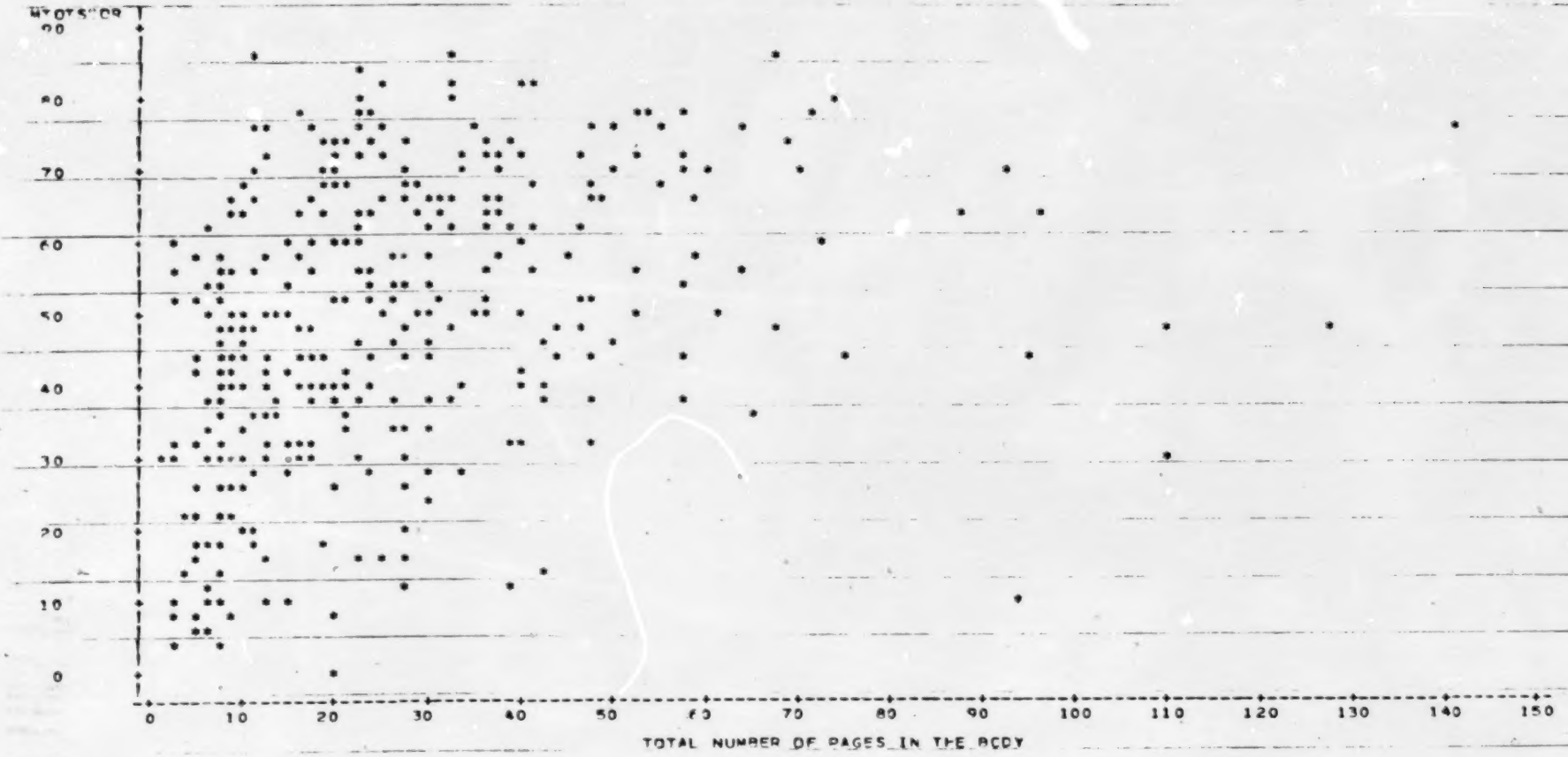
PLOT OF MYOTSCOR*TOT3 SYMBOL USED IS *



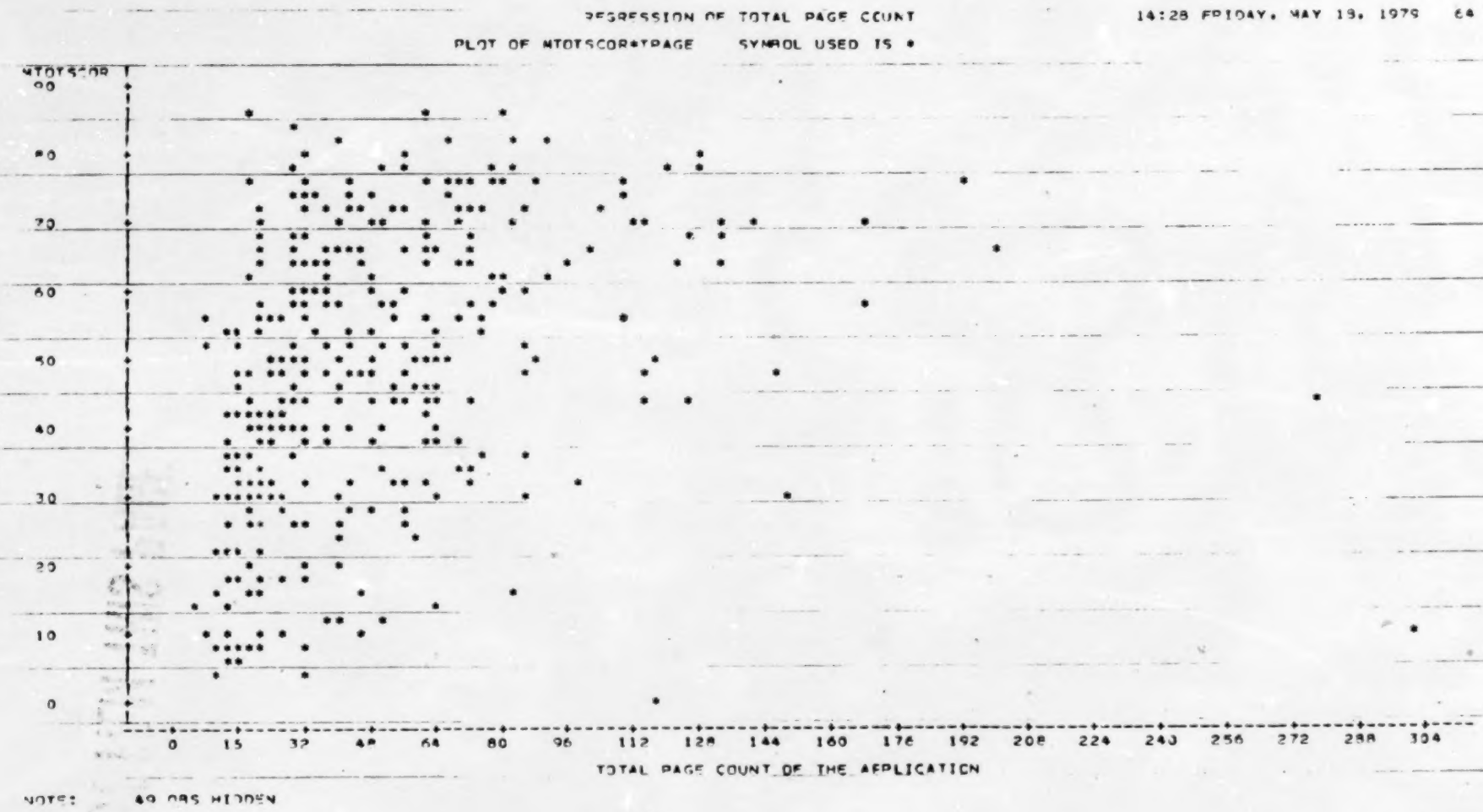
NOTE: 35 OBS HIDDEN

REGRESSION OF TOTAL NUMBER OF PAGES IN THE BODY 14:29 FRIDAY, MAY 18, 1979 62

PLOT OF MTOTSCOR*TOTPG SYMBOL USED IS *



NOTE: 37 OBS HIDDEN



NOTE: 49 OBS HIDDEN

APPENDIX B

First Derivatives of Regression Curves

First Derivatives of Regression Curves

Analysis 1: Y = Mean total evaluation rating; X = Sum of need, results and approach pages.

$Y = -.009X^2 + 1.150X + 28.532,$

$dy/dx = -.018X + 1.15,$

where $dy/dx = 0$ (maximum):

$0 = -.018X_{max} + 1.15$, thus

$X_{max} = 63.9$

Analysis 2: Y = Mean total evaluation rating; X = Total pages in the body (program narrative).

$Y = -.006X^2 + .922X + 30.795,$

$dy/dx = -.012X + .922,$

where $dy/dx = 0$ (maximum):

$0 = -.012X_{max} + .922$, thus

$X_{max} = 76.8$

Analysis 3: Y = Mean total evaluation rating; X = Total page count

$Y = -.002X^2 + .525X + 29.663,$

$dy/dx = -.004X + .525,$

where $dy/dx = 0$ (maximum):

$0 = -.004X_{max} + .525$, thus

$X_{max} = 131.3$